

REMARKS

In the Final Office Action dated December 19, 2008, the Examiner rejected claims 1-6 under 35 U.S.C. § 103(a) over U.S. Patent No. 5,561,742 to Terada et al ("Terada") in view of U.S. Patent No. 4,683,772 to Colimitra et al ("Colimitra") and U.S. Patent No. 6,459,956 to Matsumoto et al ("Matsumoto").

Applicant would like to thank the Examiner for the courtesy extended to Applicant's representative during the telephone interview held on March 16, 2009. During the interview, Applicant's representative discussed the differences between independent claim 1 and the cited references.

Claim 1 recites, among other things, a combination of "defining in a memory a virtual safety barrier including a trajectory of a work or tool ... surrounding the movable robot"; "defining at least two three-dimensional spatial regions including parts of the arm of the robot ..."; and "carrying out a control to start the braking of the arm at a predetermined distance ahead of the virtual safety barrier...."

The Office Action equates the "spatial region" between Pa1 and Pa2 around robot A in Terada to the "virtual safety barrier" as recited in the claims. See Final Office Action dated December 19, 2008, p. 5. Applicant respectfully disagrees. As shown in FIG. 1, Terada discloses "each robot stands vertically depending on an orientation for unit operation, and occupies a spatial region defined by one or two planes shifting in the Y-axis direction in accordance with the operation of the robot." *Terada*, col. 3, ll. 42-45 (emphasis added). The planes Pa1 and Pa2 are farthest planes (ymax, ymin) reachable by robot A. See *Terada*, col. 3, ll. 46-55. In operation, when robot A moves, the planes Pa1 and Pa2 (which define the region occupied by robot A) will move with

robot A. Robot A would not need to stop ahead of the planes Pa1 and Pa2 because Pa1 and Pa2 move with it. Robot A would not be controlled to brake ahead of the planes Pa1 or Pa2. Therefore, if planes Pa1 and Pa2 were equated to a "virtual safety barrier" for robot A, Terada does not teach or suggest "to start the braking of the arm at a predetermined distance ahead of the virtual safety barrier" as recited in claim 1. Applicant respectfully submits that Terada fails to disclose or suggest a "virtual safety barrier," wherein when the robot (or part of the robot) is "at a predetermined distance ahead of the virtual safety barrier", "a control to start the braking" will be carried out.

Colimitra discloses a remotely operated hand gear train having three degrees of freedom about the axes A1, A2 and A3. Colimitra fails to teach "at least two three-dimensional spatial regions including a part of the robot including said work or tool" as recited in claim 1. Nor does Colimitra teach that "each of the three-dimensional spatial regions has a substantially spherical shape with a predetermined radius, wherein the radius for each of the three-dimensional spatial regions is configured to maintain a space efficiency." Moreover, Colimitra does not disclose or suggest a "virtual safety barrier" or "carrying out a control to start the braking of the arm at a predetermined distance ahead of the virtual safety barrier" as recited in claim 1, and thus fails to cure the deficiency of Terada discussed above.

Matsumoto, which was cited as allegedly teaching a "physical safety barrier," does not disclose or suggest a "virtual safety barrier" or "carrying out a control to start the braking of the arm at a predetermined distance ahead of the virtual safety barrier" as recited in claim 1, and thus fails to cure the deficiency of Terada in view of Colimitra discussed above.

Accordingly, claim 1 is allowable over Terada in view of Colimitra and Matsumoto. Claims 2-6 are dependent upon claim 1; and thus, patentable at least for the same reasons set forth above in connection with independent claim 1.

Conclusion


In view of the foregoing remarks, Applicant respectfully requests reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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